2903-78

MEMORANDUM FOR: Director of Central Intelligence

FROM : John J. Hicks

SUBJECT : Proposed US Initiative to Establish a United Nations Aerial Reconnaissance Survey Capability

1. In January 1978 you responded to the subject proposal from me: "I'm in agreement with your U.N. idea--if you'd like to prepare a concept paper, I'll forward to SecState/Andy Young." Attached is a draft of the concept paper you suggested. I present it in draft form for two reasons:

a. In May 1978, Vice President Mondale announced to the UN General Assembly that the U.S. is prepared to consider requests for technical monitoring services--such as aircraft photo reconnaissance and ground-sensor detection--in situations where such "eyes and ears of peace" might support disengagement agreements or other regional stabilizing measures. The State Department and the Arms Control and Disarmament Agency have been and are following up that announcement with more detailed, supplementary versions of the proposal. Because this U.S. initiative was in preparation early this year, I delayed completing my concept paper. Now that I have seen the Mondale proposal, I judge that the concept I am advancing is a logical extension worth doing.

b. I have considered several ways of presenting the concept paper. The two ways that I favor are (1) an attractive brochure, like the dummy one that NPIC did for me which is attached; or, (2) a straight, typed paper like the attached draft. Of the two I favor the brochure, but I do not wish to put NPIC to the further effort on the brochure without having your opinion.

2. If you still agree that the concept is worth advancing to State and Andy Young, and if you agree that the brochure format is best, then we can soon have copies of the brochure ready for you to send. Since I am about to go on vacation, I have asked the NPIC
25X1 Executive Officer [redacted] to act for me in responding to your decision.

3. If you wish to use the straight typed paper, the NPIC Executive Officer will have it typed in final form and insert the referenced illustrations and photographs.

4. I also enclose a suggested letter of transmittal which could be used in either of the above choices.

5. The factual information in the concept paper is derived from experiences of the National Photographic Interpretation Center and CIA and other U.S. Government components. The estimates for manpower and dollar costs are drawn from the experience of NASA's Airborne Missions and Applications Division (Ames Research Center) in operating U-2 and other aircraft and exploitation systems.

John J. Hicks

Attachments:
As stated

Distribution:
Original - Addressee
1 - DDCI
1 - ER
1 - D/OGCR
1 - Exec. Off., NPIC
25X1 1 - [redacted] NPIC
1 - [redacted] NPIC
1 - J. J. Hicks
NFAC:JJHicks:mak:12 Jul 78

DRAFT TRANSMITTAL MEMO

Approved For Release 2007/01/17 : CIA-RDP82T00285R000200210011-9

DRAFT

MEMORANDUM FOR:

FROM : Stansfield Turner

SUBJECT : A specific Proposal for a U.S. Initiative in Support of a U.N. Aerial Survey Capability

I send you the attached proposal because I think it is worth your consideration. The idea came from CIA officers who are familiar with the U-2 and other aerial photo survey systems and what they can do for civil purposes.

The proposal is attractive for the following reasons:

1) the costs would be shared by the U.N. member countries, and customer nations could be charged by the U.N. for the services.

2) Under U.N. control, customer nations would be assured that foreign governmental and commercial interests would not have access to the products without the concent of the customer nation concerned.

3) U.S. agencies such as the Agency for International Development, providing support to certain foreign nations, would be able to give those nations an advantage in initiating and shaping their requests for the applications of aerial survey services.

4) U.S. commercial interests are capable of, and would be competitive in, bidding to provide the U.N. with equipment and services, and assisting customer nations to use the products.

5) The availability to the U.N. of photography with the quality and other characteristics of the U-2 or like system would dispose of some of the difficult U.S. policy questions concerning future unclassified U.S. space systems.

6) The U-2 or a like system is appropriate to the aerial survey needs of most countries. Such a system can gain complete cloud free coverage of most nations in short periods of time, the times of coverage can be coordinated with clear weather and given ground conditions, and the scale of the photography is most suitable.

U.S. announcements to the U.N. earlier this year concerned our readiness to consider requests for technical monitoring services--including aircraft photo reconnaissance. The attached proposal would complement those announcements. It extends the concept to a logical conclusion--a U.N.-owned aerial survey capability, providing a range of services to member nations.

STANSFIELD TURNER

Attachment:

As stated

DRAFT CONCEPT PAPER

PROPOSAL

It is the purpose of this paper to propose that the U.S. Government initiate and support an effort to establish a UN owned and operated aerial survey unit which would include:

- Aircraft and camera systems for obtaining the imagery.
- A film processing facility.
- Photointerpretation and analytical capabilities for extracting and reporting pertinent imagery derived data.

This unit would make available to member nations a technology which would be used in support of disaster relief efforts as well as to improve their ability to survey, manage and develop resources and industrial and transportation capabilities.

The technology is proven and equipment is available for purchase from private companies.

High altitude aerial surveys can make significant contributions to a nation's developmental programs as well as to relief of damage caused by disasters. Only a few nations possess the technology and equipment needed for conducting high altitude aerial surveys, and there is no mechanism for sharing this capability among the nations.

The United Nations Association of the USA proposed in June 1977 that the U.S. Government provide high altitude reconnaissance aircraft and facilities for film processing and analysis in support of disaster relief measures.

This paper proposes that the U.S. initiate the development of a UN owned and operated aerial survey component based on a U-2 like photographic system; including film processing and exploitation services. Estimates are given on the initial acquisition and operating costs of the services.

These services would be available to all member nations. Under UN control, access to the imagery and related products would be controlled by the nation which had requested the imagery of its territory.

SERVICES

The broad range of services that would be made available to member nations fall under two primary categories -- the assessment of natural disasters and developmental planning.

Photography of an area suffering from a natural disaster would provide the government of the affected nation with a wide range of information which could satisfy many of the fundamental requirements for conducting an effective relief program. An aerial overview would aid in determining the magnitude of the disaster and pinpoint the areas most severely affected. This information would help both the country concerned and the contributing relief organizations to identify the types of assistance needed and to establish relief priorities. It would be particularly valuable in assessing damage to remote areas which lack modern communication systems.

There are also several long term benefits from imagery collected in response to a natural disaster. Information gained from continued detailed analysis can contribute to planning the follow-on reconstruction as well as efforts to limit the impact of a recurrent disaster. Subsequently, the imagery would also serve as a basis for performing a variety of civil applications. Land use studies, natural resource inventories, transportation and communications studies, and urban planning are just a few of the many applications which could follow.

The fact that high altitude photo reconnaissance can provide the quality imagery required for assessing natural disasters and contribute to the recovery effort was demonstrated by the U-2 flights conducted with permission of the Guatemalan Government after the 1976 Guatemala earthquake. Photographic materials and preliminary reports were forwarded to the Guatemalan Government within a few days after the initial earthquake. These and follow-on reports provided the location of major landslides, blockages along major road and rail transportation routes and physical damage to major cities and towns. After attending to the needs generated by the disaster, Guatemalan government leaders and experts were quick to realize the potential uses of the imagery for resource inventories, urban planning and other civil applications.

The proposed UN aerial survey unit would make major contributions to national development programs. Knowledge of the location and extent of natural resources is essential in planning the industrial and agricultural growth of any nation. An aerial survey can

provide data for supporting resource studies of areas which are difficult or even impossible to reach on the ground. The use of this technology for geological studies supporting investigations for fossil fuels and minerals is just one of the many civil applications which would aid a customer nation in making decisions concerning the development and management of their resources. The variety of photographic sensors available for use in high altitude reconnaissance system -- stereo black and white, color, [redacted] 25X1

25X1 [redacted] -- permit a wide range of applications and would satisfy the requirements of most users.

To provide the proposed services it will be necessary to develop an organization, facilities, and equipment designed to collect, process and analyze the imagery. A description of the requirements for performing these functions and the estimated costs of doing so is provided in the following paragraphs.

ORGANIZATIONAL REQUIREMENTS

The three basic organizational elements required for accomplishing the mission of the proposed aerial survey program are:

- Administration
- Technical
- Production

A brief description of the primary duties and functions to be performed by these essential elements follows.

Administration

- Provide overall management of mission and functions of the aerial survey programs.
- Determine overall direction, objectives, and goals of the unit.
- Review, approve and prioritize requests for services.
- Insure that reproductions of the imagery and resultant products are accomplished with the approval of the customer nation.

Technical

. Plan and conduct aerial surveys.

. Control and maintain aircraft and cameras.

. Conduct imagery processing and reproduction.

. Maintain imagery processing, reproduction and interpretation equipment.

Production

. Produce imagery interpretation reports.

. Production of reports and graphic materials.

EQUIPMENT, FACILITIES AND PERSONNEL

The primary factors to be considered before selecting an aerial survey system are:

. The sizes of the areas likely to be photographed.

. Type of information needed by the user.

In most cases, simultaneous large area photographic coverage is required to support developmental planning programs or assess the damage resulting from a natural disaster.

A description of appropriate equipment follows.

Aircraft

Economic considerations drive a decision to acquire simultaneous large area coverage toward the use of high altitude aircraft such as the U-2. Such aircraft provide a stable and maneuverable photographic platform capable of conducting photographic missions at altitudes approaching 13 miles above sea-level. High altitude imagery provides the synoptic photographic data base which is vital to any nation's development program. High quality, photographic coverage of large areas can be obtained with one flight and with many less frames of imagery than required for covering the same area with a low-level aerial survey system.

For those occasions when large area coverage is not required, (i.e., photographing a proposed dam site), a photographically equipped low altitude aircraft is a more economical choice. For such contingencies an aircraft such as the U.S. Cessna could be equipped to obtain high quality images at altitudes of 500 to 12,500 feet.

In order to be prepared for any contingency, there will be a need to have available for dedicated use a minimum of two U-2 type aircraft and two Cessna-type aircraft. This will allow for unforeseen maintenance problems and assure instant response to any requested assistance.

The minimum facilities required for supporting the recommended collection systems are:

- Residence at an airfield capable of handling a U-2 type aircraft.
- Aircraft hangars and maintenance facilities capable of handling two high altitude and two low altitude aircraft.
- Management facilities.

The job skills and minimum number of personnel required for supporting these activities are: management (3); pilots (3); mission planners (3); and maintenance and support (20).

The location of the aircraft staging base can be a critical factor when a rapid assessment of a natural disaster or other emergency is needed. For example, the location of the area to be photographed may require the deployment of aircraft and support equipment to a staging base within the operational radius of the aircraft -- 2000 Km. This affects both reaction time and overall mission costs. Consideration should be given in advance to contingency plans and preparations for using various fueling and staging bases capable of handling and servicing the recommended aircraft.

Cameras

In order to provide the information necessary for assisting in disaster relief or for long range economic development, it is necessary to select cameras that will collect excellent quality stereoscopic imagery. The current state-of-the-art is such that these requirements can be satisfied with either framing or panoramic cameras currently available for purchase from private corporations.

The final selection will be driven by the ground detail required or the level of accuracy needed from photographic measures. Regardless of the system selected, stereoscopic coverage is necessary.

An example of a high quality framing camera is the "HR73B" camera. The HR73B has a 36 inch focal length and when fully loaded with 13,000 feet of 9 1/2 inch wide film can acquire 3,800 individual frames of large scale high resolution photography. Used in its most desirable mode, one mission flying at an altitude of [redacted] feet would acquire stereoscopic imagery covering a 45 nautical mile swath over a mission flight line of more than 1,800 nautical miles. The quality would be such that on the best imagery, objects on the order of [redacted] would be resolved and linear objects such as powerlines could be easily observed.

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The "IRIS" camera is a good example of a reliable panoramic camera. It has a 24 inch focal length and can acquire coverage of a 60 nautical mile swath at a scale of 1:35,000 over a flight line of 2,000 nautical miles, and at resolutions slightly better than the HR73B camera. This camera was used to obtain the high resolution imagery used to assess the damage caused by the 1976 Guatemalan earthquake.

It is recommended that two each of at least two high altitude camera types (framing, panoramic) be made available. As previously stated, there may be an occasion where large area coverage may not be necessary but low altitude very large scale coverage of a small area would be useful. For such contingencies, a U.S. Cessna-like aircraft equipped with short focal length cameras [redacted]

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[redacted]

Films

Film created especially for aerial survey use are produced by most of the leading film manufacturers. Selection depends primarily on the type and quality of information the user wishes to obtain. The HR73B and the IRIS cameras will acquire their highest resolution on thin base polyester black and white film.

However, there will be times when resolution will not be the driving factor and the use of color [redacted] film may be desirable. For example, color imagery can add to the accuracy of a geological or land use survey. Color film provides realistic color renditions of the area covered. [redacted]

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25X1 [redacted] Each film type has its own unique capabilities and planning should assume that each will be used on occasion.

Film Processing

Processing of aerial survey film can be accomplished in either a fixed facility or an air transportable unit similar to those developed for the USAF. Regardless of the type of facility selected, it must be designed to maximize the reliability of the data recorded and be equipped to process various types and sizes of aerial films.

Requirements for both a field and mobile processing facility will be discussed. However, it must be pointed out that a fixed processing facility is considered essential. A mobile processing facility is being presented primarily as an option for increasing the versatility of the proposed aerial survey unit.

Fixed Facility

There are advantages to having a fixed processing facility. A permanent facility is always available for immediate use and requires little preparation time for supporting an emergency mission. Also, the space requirements for a fixed facility are not as stringent as those of a mobile facility -- permitting an increase in processing capacity. This increased flexibility would permit several projects to be worked simultaneously.

Film processing requirements are dependent upon the type and volume of film used. Assuming that various film emulsions will be used, the facility must be designed to accommodate both color and black and white (B&W) film processing equipment.

A minimum of two B&W and two color film processors, each capable of processing film leads up to 10,000 feet, is required. This will provide adequate capacity for handling routine workloads as well as accommodating unforeseen contingencies. Further, a minimum of three contact printers capable of duplicating continuous roll film for photointerpreters should be available. Mixing and storage tanks for processing chemicals would also be required. Most aerial survey efforts will demand enlargements of selected areas or objects. Therefore, at least two enlargers capable of making enlargements of up to 60x magnifications should be available for routine use.

Dryers will also be necessary for products coming from the printers and enlargers. There is a need for sufficient space to store the unexposed film and paper required for supporting the processing and printing activities.

A photo laboratory housing and supporting the minimum requirements stated would take approximately 2,500 square feet of floor space and require a minimum of 5 personnel to operate an 8-hour/day, five-day/week schedule.

Mobile Processing Facility

A mobile film processing facility offers some advantages in a disaster preparedness role. It can be deployed via C-130 aircraft to the aircraft recovery site or host country and within hours be made ready to receive and process imagery. Such an arrangement would contribute to a rapid assessment of the problem area, and in turn, speed the overall decision making process with regard to relief supplies.

There are several disadvantages to the use of a mobile processing facility. Deployment of a mobile processing facility requires a C-130 or similar aircraft. The compact design of a mobile facility does not permit precise quality control, large chemical storage tanks, or room for storing large quantities of sensitized film and paper products. A mobile facility would therefore require more frequent resupply efforts.

A mobile black and white film processing laboratory would require a minimum of four van type shelters:

. Film Processing

. Printing

. Administrative and Maintenance

. Material Storage

These four shelters would contain facilities for processing and duplicating continuous rolls of aerial film; chemical mixing and storage; refrigerated storage of sensitized film and paper products; routine maintenance of photographic equipment; and administrative support.

A mobile laboratory with color processing capabilities added is more complex than its black and white counterpart, and would require a total of seven van type shelters:

- Administrative
- Storage
- Printing
- Maintenance
- Continuous film processing
- Chemical mix
- Water Conditioner

The first four shelters listed serve basically the same functions as in the black and white photo processing facility described. The three additional shelters are needed to house the larger and more complex continuous film processor needed for color film, special color chemical mixing and transfer equipment, and a water conditioner designed to meet the stringent water filtering and temperature demands for color processing.

INFORMATION PROCESSING AND ANALYSIS

Analytical and support services needed for analyzing the imagery collected, and translating the pertinent information into reports which are responsive to the customers needs are: image exploitation, mensuration, collateral information, and reports and publications.

Photointerpretation

It is important to staff the interpretation facility with photointerpreters knowledgeable of the subject or area under study. It should be expected that photointerpreters will be called upon to provide photo analysis for a number of study topics. Therefore, photointerpreters must be capable of performing the detailed analysis required for supporting, for example, economic development programs as well as the rapid analysis needed for timely disaster assessments. The skills required for these tasks differ somewhat. Detailed analysis of imagery collected in support of an economic development program demands both photointerpretation skills and

knowledge of the subject or area under study such as geology, forestry or agriculture. On the other hand, the rapid recognition of changes to natural or man made features and their significance is most important for obtaining a rapid assessment of damage caused by a sudden disaster. Photointerpreters trained in rapid recognition and at least one of the applicable disciplines are useful. A minimum of 10 imagery interpreters will be required to staff a full time imagery interpretation effort (8 hr/day, 5 days/week).

The basic viewing equipment needed for each imagery interpreter is a light table designed for viewing continuous roll film transparencies and a stereo microscope. Approximately 160 square feet of floor space is needed for each imagery interpretation station.

The light table must provide the stable viewing base and uniform light intensity needed for conducting detailed photo analysis, and accommodate various sized rolls and formats of both negative and positive film transparencies.

A variety of light tables ranging from manually operated desk top models to more sophisticated motorized floor models are available. An example of a light table which meets the above mentioned requirements is pictured on page __. This and similar light tables equipped with a stereomicroscope will permit stereo viewing of selected images from two rolls of stereoscopic film transparencies up to 9.5 inches wide.

Stereoscopic viewing is essential for conducting detailed photographic analysis. A three dimensional view allows the interpreter to more accurately extract spatial relationships and identify and measure objects from the imagery at hand.

A stereomicroscope mounted on a "light table" will permit the viewing of both monocular and stereoscopic imagery at various magnifications.

A mobile van similar to those used for mobile film processing can be provided to support detailed imagery interpretation. These vans can be deployed to the customer nation or other forward area in conjunction with a mobile processing unit or independently. Each van will accommodate 3-4 light tables and cabinets for storage of data base and film products.

A mobile interpretation facility would be most useful when used in support of a sudden disaster. Reports then could be forwarded to the government of the affected country without delay. This would also facilitate trained imagery analysts or related specialists from the host country in assisting with the imagery assessment.

It must be pointed out, however, that the transportation and logistical problems cited for a mobile processing facility would also apply in this case. Again the fixed facility is considered essential to an effective on-going exploitation capability and a mobile unit should be considered only as an option for increasing the units overall versatility and effectiveness.

It is necessary that a collateral information library be co-located with the interpretation facility since collateral data is an essential element in the analysis of aerial imagery.

Imagery analysis often requires many types of information other than what is recorded on the imagery. It is important that collateral information (i.e., maps, historical imagery, literature, etc.), pertinent to the topic or area under study, be made available to the imagery analysts. For example, maps aid the analyst in identifying and locating national and man-made features; geographical and cultural data provide information useful in conducting and verifying the analysis; historical aerial and ground photography provides a basis for detecting change.

An important aspect in the identification and analysis of imagery derived data is the mensuration of pertinent objects or areas. A skilled imagery analyst can make non-critical measurements using hand-held measuring equipment and appropriate scale values. However, accurate measurements must be made with sophisticated mensuration equipment. A stereo comparator, with an associated mini computer for handling the analytical processing, is needed for obtaining accurate three dimensional measurements from the types of imagery collected by the recommended aerial cameras. If the imagery is to be used for providing mapping data, an analytical plotter is required.

Both processes demand accurate acquisition parameters such as the height and altitude of the collection platform. This information can be obtained from an on-board inertial navigational system or from accurate ground control data.

Two trained photogrammetrists would be required to support 10 imagery analysts.

The finished analyses must be transferred into report forms designed to meet the specific needs of the customer. Written reports, annotated photographic prints, and assorted graphics are a few examples of the types of products required. A minimum of two report writers, two graphics specialists and one typist will be needed for this task.

OTHER OPTIONS

Although this proposal recommends a United Nations owned and operated aerial survey unit, there are other options for collecting, processing and analyzing the imagery which may reduce the initial cost, yet, if selected, would have no effect on the overall objectives of this proposal. Among those that could be considered effective are:

Option 2

The imagery collection and film processing services as well as the imagery exploitation and reporting services can be accomplished through contracts with private corporations or member nations. There are many commercial and governmental organizations such as the US/NASA who are completely experienced and capable of providing all these services. Under this option -- as is the case in all following options -- the UN would establish a mechanism for assisting a requesting member nation in planning for and obtaining an aerial survey and insuring that access to the imagery and resulting products would be controlled by the requester. Conditions for funding could be explored by the UN if the case is such that the requester would not be able to accept the cost.

Option 3

Contract for imagery collection and film processing and establish a UN owned and operated fixed information processing facility responsible for conducting the imagery exploitation and reporting services. This option would eliminate the initial costs of procuring aircraft and cameras and for the continuous maintenance of associated facilities. It would also eliminate the need to establish and maintain a film processing laboratory.

Option 4

Contract for imagery collection and establish a UN owned and operated fixed film processing and information processing facilities. This option would eliminate the management of, and costs for procuring aircraft, cameras and supportive facilities yet provide the advantage of maintaining quality control of the film products and the exploitation activities.

APPENDIX A

Estimated costs for purchasing the equipment needed to provide the recommended services as well as an estimate of the first year operational cost are provided below in 1978 dollars. Costs for establishing permanent facilities for housing these services are dependent upon many factors, such as location and building materials used, and will not be presented.

Salaries include estimated costs for working level and management personnel.

IMAGERY COLLECTION

	Equipment Cost	Operating Cost
Aircraft		
[redacted]		

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*High altitude aircraft [redacted] (formula includes aircraft and camera maintenance, film and salaries for conducting aerial surveys but not the initial procurement costs).

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